LIGO LAB R&D PROGRAM TECHNICAL REVIEW, OCT 02

SUSPENSIONS RESEARCH AND DEVELOPMENT

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LIGO LAB R&D CURRENT STATUS

- ONE MODE CLEANER CONTROLS PROTOTYPE ASSEMBLED. SECOND PROTOTYPE, FOR LASTI, READY FOR ASSEMBLY.
- RECYCLING MIRROR MODELING PROGRESSING.
- MIT QUAD PROTOTYPE STILL UNDERGOING TESTING.
- GEO PORTION OF MC ELECTRONICS DUE ~OCTOBER 12.
- CIT PORTION OF MC ELECTRONICS DUE ~ OCTOBER 12.
- DSPACE SYSTEMS UP AND GOING AT CIT AND LASTI.
- 3D TEAMWORKS AS A COLLABORATIVE TOOL IS UP AND WORKING.

LIGO LAB R&D 2003 MILESTONES AND GOALS

- OPTIMIZE CIT MODE CLEANER CONTROLS PROTOTYPE – WINCH, LIBRARY OF ANGLED BLADE CLAMPS, EDDY CURRENT DAMPERS, JIGS & CATCHER.
- MODE CLEANER CONTROLS PROTOTYPE DELIVERED AND TESTED AT LASTI – MID DECEMBER (DEPENDENT ON SEISMIC CHAMBER AVAILABILITY.)
- RECYCLING MIRROR CONTROLS PROTOTYPE DELIVERED AND TESTED AT LASTI – MID FEBRUARY
- LASTI CAVITY TEST – MID MARCH
- HAM CAVITY PRELIMINARY DESIGN REVIEW – MID JUNE
- FABRICATE AND ASSEMBLE END TEST MASS QUAD CONTROLS PROTOTYPE – MID SEPTEMBER

LIGO LAB R&D TECH RISKS & OPPORTUNITIES

RISKS

- MAGNETIC INTERACTION BETWEEN SUS AND SEI – START QUANTIFICATION IN OCTOBER
- REPEATABILITY AND DURABILITY OF FIBERS/RIBBONS
- HANDLING/SAFETY OF QUAD OPTICS AND SUSPENSIONS.

OPPORTUNITIES

- EDDY CURRENT DAMPING
- ELECTROSTATIC
- LESS NOISY SHADOW SENSOR
- INTERFEROMETRIC SENSOR
- FINE TUNING OF TEST MASS DC POSITION

LIGO LAB SUS R&D SCHEDULE ISSUES

- SUSPENSION SCHEDULE IS DEPENDENT ON SEISMIC UPGRADE SCHEDULE.
- PREPARING THE SYNCHROTRON LAB SPACE HAS BEEN SLOWER THAN EXPECTED.
- BLADE FABRICATION AND TESTING IS TIME CONSUMING, AS EXPECTED.
- DOCUMENTATION TAKES TIME AWAY FROM THE LAB – BUT IS NECESSARY.

LIGO LAB SUS R&D FY2002 BUDGET & ACTUALS

EQUIPMENT

5.10 SUSPENSIONS & FIBERS ACCOUNT EQUIPMENT AND SUPPLIES

- Phil L.'s BUDGET$200,552
- ACTUAL $59,933

5.16 LASTI PROTOTYPE FAB ACCOUNT EQUIPMENT AND SUPPLIES

- Phil L.'s BUDGET $87,500
- ACTUAL $112,991

5.17 CIT PROTOTYPE FAB ACCOUNT EQUIPMENT AND SUPPLIES

- Phil L.'s BUDGET $67,500
- ACTUAL $96,953

Total budget: $355,552

Total actual: $269,577

LIGO LAB SUS R&D
FY2003 COST BASELINE & ISSUES

EQUIPMENT

- Advanced Suspensions & Fibers – $1244k budgeted for equipment, subcontracts, materials and supplies (see http://ligo.caltech.edu/~tfrey/rd2003/FY2003.htm)
- New estimate comes to $1144k for 5.10, 5.16 and 5.17.
- Risks: Dspace not enough, new HAM install fixtures required.

LIGO LAB SUS R&D
FY03 COST BASELINE & ISSUES

Preliminary Design: 9/2/01 through 9/15/04
Costs fall under FY02 and FY03 and FY04

Equipment and Supplies Forecast for Preliminary Design

			FY02	FY03	FY04	comments
Ribbon Process Design	45,500	laser, sapphire, microscope	5500	40,000		
Optic/ribbon attach dsgn	26,000	sapphire parts, strength tester	10,000	16,000		
Sensor/actuator design	34,400	prototype osems, supplies	10,000	24,400		
Electrostatic design	11,000	mask, coating, controls		11,000		
BSC mech. design	80,000	structure, blade springs		40,000		reduce - bought blade mat.
BSC electronics	99,065	all electronics		85,600		reduce per Jay
BSC assy fixtures	253,000	holding fixtures, holding arm	12,000	200,000	41,000	CES making one ergo arm now
BSC installation fixtures	305,000	crane/hoist, install fixtures	5000	200,000	100,000	bought crane
BSC prototype electr.	205,065	electronics, structure,springs	20,000	191,600		FY02 blade mat., reduce from dSPACE
HAM mech design	80,000	blades, structures	50,000	30,000		FY02 blade material for MC, RM
HAM electronics design	83,065	electronics	45,000	35,700		racks, cables, white/dewhite
HAM assy fixtures	54,000	assy fixtures	30,000	20,000		reduce by 4k
HAM install fixtures	302,000	install fixtures		50,000		borrrow LIGO1 install fixtures
HAM prototype fab	355,265	electronics, structure, springs	80,000	200,000	75,265	reduce due to <structure cost
						total:
Totals	1,933,360		267500	1,144,300	216265	1,628,065

LIGO LAB SUS R&D
FY2003 COST BASELINE & ISSUES

LABOR

ACTUAL

- CIT LABOR FROM R&D: PHIL, HELENA: 1.75 FTEs
- CIT LABOR FROM OPS.: CALUM, JANEEN, MARK: ~2.75 FTEs
- CIT LABOR FROM OPTS AVAILABLE: ELECT. ENGS/TECHS.: ~0.25 FTE
- TOTAL: ~5

ASSESSED NEED

- TOTAL: ~6.5

CONCLUSION: UNDERSTAFFED

NOTE: THIS DOES NOT INCLUDE GEO LABOR.

LIGO LAB SUS R&D STAFFING ISSUES

- PERSONNEL NEEDED AT CIT:
  - A MECH. LAB TECHNICIAN (A MYRON-PERSON) – 0.5 FTE
  - A MECH. DRAFTER/DESIGNER – 1 FTE
- PERSONNEL NEEDED AT LASTI DURING CONTROLS PROTOTYPE TESTING (ABOVE AND BEYOND CIT AND GEO VISITORS.)
  - PHYSICIST - 2 MONTHS
  - TECHNICIAN - 1 MONTH
- GEO HAS ~7 FTEs WORKING ON ADLIGO SUSPENSIONS AND MATERIALS/FIBERS.
  - INTERACTIONS ARE WORKING WELL.